Preschool STEAM: Yes They Can!

(Science, Technology, Engineering, Arts & Math)

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ABSTRACT: This project addresses the need for STEM (Science, Technology, Engineering, and Math) initiatives at the early childhood level. Research states that early exposure to STEM initiatives and activities positively impacts elementary students' perceptions and dispositions (Bagiati, Yoon, Evangelou, & Ngambeki, 2010; Bybee, & Fuchs, 2006; DeJarnette, 2012). The goal of this research is to positively impact the implementation of STEAM (Science, Technology, Engineering, Arts and Math) lessons in the Early Childhood classroom through providing professional development for the Early Childhood teachers. It is hypothesized that through professional development, resources, and support, Early Childhood teachers will build efficacy and build positive dispositions towards developing consistent STEAM lessons for their preschool students.

GOAL:

To train in-service preschool teachers to efficiently and effectively incorporate STEAM in the early childhood classroom curriculum in order to have a greater impact on urban and minority preschool children's dispositions towards STEM.

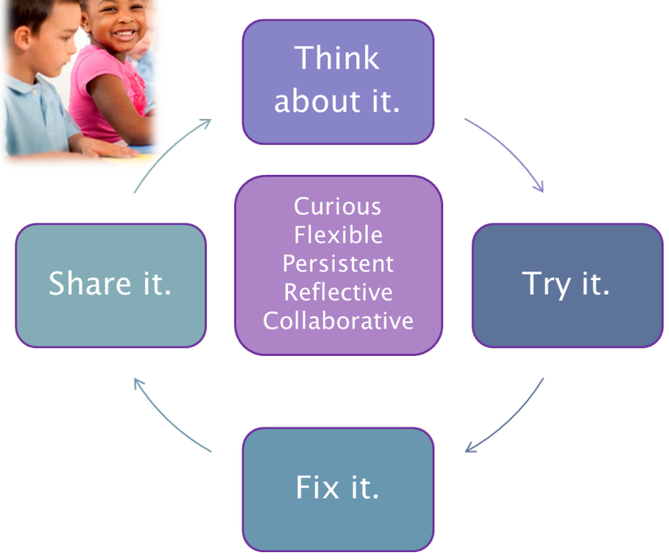
RESEARCH QUESTIONS:

*1) What will the result of providing staff development in STEAM (Science, Technology, Engineering, Arts and Math) initiatives for preschool teachers in high needs schools have on the **rate of implementation** of STEAM pedagogy in the early childhood classroom?*

*2) What will the result of providing staff development in STEAM initiatives for preschool teachers in high needs schools have on the **self-efficacy** of early childhood teachers as they implement?*

*3) What will the result of providing staff development in STEAM initiatives for preschool teachers in high needs schools have on the **dispositions** of early childhood teachers towards STEM as they implement?*

Thinking Skills for the Problem-Solving Framework



METHODOLOGY:

- Two days of Professional Development workshop will consist of a hands-on presentation providing models of STEAM activities teachers can implement with their early childhood students.
- Pre and Post Surveys will question the preschool teacher participants concerning their knowledge, skills, and dispositions regarding STEAM implementation within their classrooms
- All materials are inexpensive or use every day recyclables. For the preschool level, STEAM (add Arts) activities are built around children's literature.
- The STEAM activities follow the new NGSS (Next Generation Science Standards) and incorporate the Children's Engineering Design Model.
- Participating teachers will be encouraged to invite the researcher into their classrooms to observe and assist with STEAM lessons during the spring 2016 semester.
- Teacher interviews will be conducted after these classroom observations regarding their efficacy towards STEAM implementation efforts.
- Focus groups will be conducted during the final professional development day in May, gathering feedback regarding the STEAM implementation process.
- **Funding provided by the UB Seed Funding Grant 2016**

SAMPLE PROBLEM-SOLVING ACTIVITY:

PROFESSIONAL DEVELOPMENT:

Two days of Professional Development were provided for the Bridgeport ABCD Early Learning Center Preschool Teachers (n=50).

LITERATURE:

Research has shown that early exposure to STEM initiatives and activities positively impacts elementary students' perceptions and dispositions towards STEM (Bagiati, Yoon, Evangelou, & Ngambeki, 2010; Bybee & Fuchs, 2006; DeJarnette, 2012). As STEM initiatives continue to grow in America, the need for early exposure during the elementary years is gaining popularity (Bagiati, et al., 2010). By exposing children to STEM disciplines during the elementary years through hands-on, interactive, and problem solving activities, research indicates that children's interest in STEM career fields' increases which establishes an educational pathway for the future (Katehi, Pearson, & Feder, 2009).

Young children between the ages of three and eight, contrary to previous beliefs, are at a prime age for learning STEM content. Young children are natural scientists (Banko, Grant, Jabot, McCormack and O'Brien, 2013). Primary age children are very inquisitive and have a unique desire to thoroughly explore their surroundings. They continuously question and want to know "why" things happen as they do in their world. The children's engineering design activities presented in this research study provided young students with engineering design challenges related to the children's literature read to them, as well as working with peers in a collaborative setting to solve a problem, or design challenge.